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RESULTS OF THE AERIAL PHOTOGRAPHIC GROUND CHECK ON THE SQUAW RIDGE PINE BEETLE SURVEY PLOT ON THE DESCHUTES NATIONAL FOREST

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INTRODUCTION

On October 21, 1947, the N3N biplane of the Bureau of Entomology and Plant Quarantine, with J. F. Wear as pilot and R. L. Furniss as photographer, flew over the 320 acre Squaw Ridge pine beetle survey plot (Township 13S, Range 10E, Section 27 E/2) on the Deschutes National Forest. Aerial photographs were taken at scales of 1:2,500, 1:5,000, and 1:7,500 with a K-17 camera (six inch focal length) borrowed from the United States Naval Air Base at Seattle.

Prior to this flight, W. J. Buckhorn had worked the SE and the NE section corners and the quarter-corners on the south and north lines of the plot with about 30 square feet of newspaper spread on the ground at or near the corners. On the morning of the flight, Buckhorn set a fire between the section corner and south quarter corner as a guide for the pilot.

The negatives were developed and printed in the darkroom of the Portland Laboratory. After matching the photographs, Buckhorn and Wear, with the aid of stereoscopes, magnifying glass, and the naked eye, spotted the insect-killed trees discernible on the best prints. Each tree or group of trees was circled with a red wax pencil. These trees were then spotted on a vellum overlay divided into 10 acre squares.

On November 13 and 14, Buckhorn, Wear and Whiteside visited the Squaw Ridge check plot to conduct a ground check of the trees spotted on the aerial photographs, It was found that most of the trees on the north half of the plot had been or were being felled. Thus, it was necessary to limit the ground check to that portion of the plot south of the Brooks Scanlon railroad track, or the south half of the check plot. Some trees have also been felled along the east line on the south half of the plot; however, the ground check was assumed to have covered 160 acres of the plot. All of the trees spotted on the aerial photographs south of the railroad track were visited and notes made as to their size, needle color, and crown length and width. The photos were taken into the field and checked on the ground with a stereoscope.

INSECT-CAUSED LOSSES ON THE SQUAW RIDGE CHECK PLOT

Annual surveys have been made on the Squaw Ridge check plots from September 18, 1935 through September 4, 1947, by three-man survey parties. All insect-killed trees have been blazed, numbered, measured, and mapped. During the period a total of 2,785 trees and 1,171,200 board feet have been killed on this half section.

For the present study, we were interested only in the recent losses - from 1945 through 1947. The 1945-1947 mortality on this plot has totaled 710 trees and 261,180 board feet. South of the railroad track, 303 trees have been killed. Most of the insect-killed trees on the plot were single trees but occasional groups of trees ranging from 2 to 11 trees have been marked since 1945.

On this plot there are at present a large number of trees with active top-killing as well as a large number of high risk trees ((California Classes 3 and 4), which, with the trees already killed, give the stand on the plot a very unhealthy appearance. In the present study we were also interested in knowing how many of these low vigor trees would be spotted from aerial photographs.

OBJECTIVES OF THE GROUND CHECK

The primary objectives of the ground check may be stated as follows:

1. To determine the percentage of each season's kill showing in the photographs of various scales.

2. To record data on tree diameter, crown class, and crown size to show the relationship between crown characters and aerial detection.

3. To determine to what extent and in what way top-killed trees, high risk trees, and recent snags show up in the photographs.

4. To determine the percentage of trees killed in groups that can be detected from aerial photos.

RESULTS OF THE GROUND CHECK

It should be clearly understood that all photographs used in this study were poor and that the results herein reported are by no means indicative of what can be done.

Photographs at scales of 1:5,000 and 1:7,500 were used in this study. At both scales, large portions of the photographs were not examined because of under exposure, lack of adequate coverage, etc.

Number of Trees Spotted

At 1:5,000, a total of 49 circles or spots were marked on the south half of the check plot. On the ground 15 of these spots proved to be blanks, that is, no trees were found.

At 1:7,500, a total of 41 spots were marked of which 14 were blanks.

A total of 16 insect-killed trees were spotted on both scales. At 1:5,000 there were 19 trees spotted which did not appear on the 7,500 scale. At 1:7,500 there were 11 trees which did not appear on the photographs.

Diameter of Trees Spotted

The trees spotted ranged in diameter from 12 to 46 inches DBH with an average of 45 trees of 22.7 inches DBH.

Crown Classes of Trees Spotted

The following is a summary of the age and vigor classes of the trees spotted:

	Vigor Class				
Age Class	A	B	C	D	Total
1	0	0	0	0	0
2	0	0	0	0	0
3	0	11	18	4	32
4	1	4	6	1	12
Total	1	15	24	5	45

Crown Size of Trees Spotted

The crowns of the trees spotted were divided into three broad classes: wide, medium, and narrow. There were 18 trees with wide crowns, 14 with medium crowns, and 13 trees with narrow crowns.

Color of the Needles on the Trees Spotted

Three broad classes of needle color were recognized: bright, medium, and dull. The observers picked up 29 trees with bright needles, 9 trees with medium colored needles, and 6 trees with dull colored needles.

Amount of Foliage on Trees Spotted

The amount of foliage on the trees spotted was roughly divided into three classes; light, medium, and heavy. We found 12 trees with light foliage, 22 trees with medium foliage and 11 trees with heavy foliage.

Percentage of Annual Mortality Spotted

In the study we were concerned only with trees killed in 1945, 1946, and 1946. From the records taken by the three-man survey crews the total number of trees killed on the south half of the check plot during these three years was determined. The following summary gives the total number of trees killed, the number of trees spotted, and the percentage of the annual mortality spotted:

	Year of Loss			
	1945	1946	1947 Partial	Total
Number of trees killed	184	91	28	303
Number of trees spotted on photos	3	31	10	44
Percentage of annual mortality spotted on photos	1.6	34	36	14.5

It should be mentioned that there were 24 trees killed in 1947 and marked by the three-man survey crew on September 4, 1947. From the aerial photographs 4 additional trees killed in 1947 were located. These trees have been added together because it is felt that had the two surveys been made at the same time the number of trees would have been the same.

The distribution of the trees marked by the three-man survey crews and those spotted from the aerial photographs is shown on two vellum overlay sheets attached to this summary.

General Observations

From this study, the following general observations have been drawn:

1. Photographs taken in the fall of a given year show portions of three years losses; however only a very small percentage of the oldest trees show.

2. Photographs taken in the spring should show only two years' losses with the highest percentage being those trees killed during the preceding year.

3. Trees on which the needles have fallen from the top 1/2 or 3/4 do not show.

4. Diameter is not important since trees down to 12 inches or well below merchantable size can be located from even the poorest photos.

5. Width of crown is more important than length of crown. A small tree with a flat wide crown shows up to a greater extent than a larger tree with a long narrow crown.

6. Large wide crowns tend to obscure adjacent trees with smaller or narrower crowns.

7. Large trees casting long shadows also tend to obscure smaller trees. (see also item 13).

8. Bright red foliage is outstanding. As foliage becomes duller it becomes less conspicuous on the photographs.

9. Dense foliage shows better than light foliage; however trees having medium foliage show well.

10. Top killed trees or trees of extreme high risk did not show a bug tree. Only one top-killed tree was spotted by the observers as being a bug tree.

11. Recent snags (without needles) do not show.

12. Old snags (white) with the proper lighting showed as bug trees. A group of 5 old white snags showed clearly on the 1:7,500 photos due to the lighting at the time of the flight.

13. With good photographs it should be possible to pick most of the trees in group-killed trees. On poor photos one group of 3 trees and one group of 2 trees were correctly spotted. However, in five other cases only 1 tree in three groups of two trees and only 1 tree in two groups of three trees was spotted.

14. With good photographs at either 1:7,500 or 1:5,000(approximately) aerial detection of insect-killed ponderosa pine should be relatively simple and very accurate.